Growth Intercept Models and Tables for British Columbia — Coastal Species

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GROWTH INTERCEPT MODELS AND TABLES FOR BRITISH COLUMBIA — COASTAL SPECIES

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This field guide insert presents the growth intercept models and tables available for use in coastal regions of British Columbia. Included are growth intercept models and tables for:

Species	Code	Reference	Revised
Western Hemlock	Hw	Nigh (1999)	Oct. 1999
Sitka Spruce	Ss	Nigh (1999)	Oct. 1999
Douglas-fir	Fd	Nigh (1997)	Oct. 1999

The Options section notes any options and alternative models or model formulations, and provides references that are available from the above address.

The tables are designed for rough estimation of site index in the field. The formulation or the appropriate publication should be consulted for accurate site index determination.

The arbitrary range of site index in the tables is 10–50 m. The tables are in a common format for consistency among species and do not necessarily represent the range of site indices found in the model development data. Site index is based on top height and a reference age of 50 years (breast height) for all species. Estimates of growth intercept and site index that are beyond the range of the data used in the analyses (given in the Notes section for each species) should be interpreted with caution.

The tables presented in this handbook do not have sufficient resolution, particularly at young ages, to be used in silviculture surveys. Silviculture surveyors, and others who need to estimate site index during a silviculture survey or a reconnaissance, should consult the appropriate field guide for silviculture surveys (B.C. Min. For. 1995. Growth intercept method for silviculture surveys. Forest Practices Br., Victoria, B.C.). As well, information about the application of the models can be obtained from the source reports.

Growth intercept models and tables will be refined and updated as new information becomes available. A revised reference list will be issued with each addition or revision. Write to the above address for updates.

Coastal Western Hemlock

Source:

Nigh, G.D. 1999. Revised growth intercept models for coastal western hemlock, Sitka spruce, and interior spruce. B.C. Min. For., Res. Br., Victoria, B.C. Exten. Note 37.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 4.36\ GI_{1}^{0.464}$	26	$SI = 1.3 + 0.944\ GI_{26}^{0.820}$
2	$SI = 1.3 + 3.68\ GI_{2}^{0.505}$	27	$SI = 1.3 + 0.885\ GI_{27}^{0.836}$
3	$SI = 1.3 + 3.36\ GI_{3}^{0.530}$	28	$SI = 1.3 + 0.841\ GI_{28}^{0.849}$
4	$SI = 1.3 + 3.22\ GI_{4}^{0.543}$	29	$SI = 1.3 + 0.796\ GI_{29}^{0.862}$
5	$SI = 1.3 + 2.86\ GI_{5}^{0.575}$	30	$SI = 1.3 + 0.748\ GI_{30}^{0.878}$
6	$SI = 1.3 + 2.46\ GI_{6}^{0.613}$	31	$SI = 1.3 + 0.703\ GI_{31}^{0.894}$
7	$SI = 1.3 + 2.23\ GI_{7}^{0.637}$	32	$SI = 1.3 + 0.661\ GI_{32}^{0.910}$
8	$SI = 1.3 + 2.15\ GI_{8}^{0.644}$	33	$SI = 1.3 + 0.622\ GI_{33}^{0.925}$
9	$SI = 1.3 + 2.03\ GI_{9}^{0.655}$	34	$SI = 1.3 + 0.591\ GI_{34}^{0.939}$
10	$SI = 1.3 + 1.84\ GI_{10}^{0.676}$	35	$SI = 1.3 + 0.570\ GI_{35}^{0.949}$
11	$SI = 1.3 + 1.69\ GI_{11}^{0.694}$	36	$SI = 1.3 + 0.554\ GI_{36}^{0.957}$
12	$SI = 1.3 + 1.55\ GI_{12}^{0.712}$	37	$SI = 1.3 + 0.542\ GI_{37}^{0.964}$
13	$SI = 1.3 + 1.44\ GI_{13}^{0.727}$	38	$SI = 1.3 + 0.532\ GI_{38}^{0.970}$
14	$SI = 1.3 + 1.39\ GI_{14}^{0.734}$	39	$SI = 1.3 + 0.523\ GI_{39}^{0.975}$
15	$SI = 1.3 + 1.36\ GI_{15}^{0.738}$	40	$SI = 1.3 + 0.514\ GI_{40}^{0.981}$
16	$SI = 1.3 + 1.33\ GI_{16}^{0.742}$	41	$SI = 1.3 + 0.507\ GI_{41}^{0.985}$
17	$SI = 1.3 + 1.29\ GI_{17}^{0.749}$	42	$SI = 1.3 + 0.504\ GI_{42}^{0.988}$
18	$SI = 1.3 + 1.25\ GI_{18}^{0.755}$	43	$SI = 1.3 + 0.502\ GI_{43}^{0.990}$
19	$SI = 1.3 + 1.21\ GI_{19}^{0.763}$	44	$SI = 1.3 + 0.500\ GI_{44}^{0.991}$
20	$SI = 1.3 + 1.16\ GI_{20}^{0.772}$	45	$SI = 1.3 + 0.499\ GI_{45}^{0.993}$
21	$SI = 1.3 + 1.13\ GI_{21}^{0.779}$	46	$SI = 1.3 + 0.499\ GI_{46}^{0.994}$
22	$SI = 1.3 + 1.09\ GI_{22}^{0.786}$	47	$SI = 1.3 + 0.499\ GI_{47}^{0.995}$
23	$SI = 1.3 + 1.05\ GI_{23}^{0.794}$	48	$SI = 1.3 + 0.496\ GI_{48}^{0.997}$
24	$SI = 1.3 + 1.03\ GI_{24}^{0.799}$	49	$SI = 1.3 + 0.494\ GI_{49}^{1.00}$
25	$SI = 1.3 + 0.995\ GI_{25}^{0.806}$	50	$SI = 1.3 + 0.491\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Coastal Western Hemlock

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	27	41	–	–	–	–	–	–	–	–	–	–	–	–
4	18	28	35	42	47	–	–	–	–	–	–	–	–	–
6	13	21	28	34	39	44	48	–	–	–	–	–	–	–
8	10	17	23	28	32	36	40	44	47	50	–	–	–	–
10	–	14	19	23	27	31	34	37	40	43	46	49	–	–
12	–	12	16	20	23	26	29	32	35	38	40	43	45	48
14	–	10	14	17	20	23	26	28	31	33	36	38	40	43
16	–	–	12	15	18	21	23	25	28	30	32	34	36	38
18	–	–	11	14	16	19	21	23	25	27	29	31	33	35
20	–	–	10	13	15	17	19	21	23	25	27	29	30	32
22	–	–	–	11	14	16	18	19	21	23	25	26	28	30
24	–	–	–	11	13	14	16	18	20	21	23	25	26	28
26	–	–	–	10	12	13	15	17	18	20	21	23	25	26
28	–	–	–	–	11	12	14	16	17	19	20	22	23	24
30	–	–	–	–	10	11	13	14	16	17	19	20	22	23
32	–	–	–	–	–	10	12	13	15	16	18	19	20	22
34	–	–	–	–	–	10	11	13	14	15	17	18	19	21
36	–	–	–	–	–	–	11	12	13	14	16	17	18	20
38	–	–	–	–	–	–	10	11	13	14	15	16	17	19
40	–	–	–	–	–	–	10	11	12	13	14	16	17	18
42	–	–	–	–	–	–	–	10	11	13	14	15	16	17
44	–	–	–	–	–	–	–	10	11	12	13	14	15	17
46	–	–	–	–	–	–	–	10	11	12	13	14	15	16
48	–	–	–	–	–	–	–	–	10	11	12	13	14	15
50	–	–	–	–	–	–	–	–	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
50	–	–	–	–	–	–	–	–	–	–	–	–	–	12
45	47	49	–	–	–	–	–	–	–	–	–	–	–	14
40	42	44	46	48	50	–	–	–	–	–	–	–	–	16
37	39	41	42	44	46	47	49	–	–	–	–	–	–	18
34	36	37	39	41	42	44	45	47	48	50	–	–	–	20
31	33	35	36	38	39	41	42	44	45	47	48	49	–	22
29	31	32	34	35	37	38	39	41	42	44	45	46	48	24
27	29	30	32	33	35	36	37	39	40	41	43	44	45	26
26	27	29	30	31	33	34	36	37	38	39	41	42	43	28
24	26	27	29	30	31	33	34	35	36	38	39	40	42	30
23	24	26	27	28	30	31	32	34	35	36	37	39	40	32
22	23	24	26	27	28	30	31	32	33	35	36	37	39	34
21	22	23	25	26	27	28	30	31	32	33	35	36	37	36
20	21	22	24	25	26	27	29	30	31	32	33	35	36	38
19	20	21	23	24	25	26	27	29	30	31	32	33	34	40
18	20	21	22	23	24	25	26	28	29	30	31	32	33	42
18	19	20	21	22	23	24	25	27	28	29	30	31	32	44
17	18	19	20	21	22	23	25	26	27	28	29	30	31	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the sub-nodal branches (see source report). This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

These models were updated to incorporate the latest growth intercept modelling techniques.

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row corresponding to the ring count and the column most closely corresponding to the tree height. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 46 stem analysis plots located in the Coastal Western Hemlock biogeoclimatic zone. Plots ranged in site index from about 7 to 40 m, and the growth intercepts ranged from about 10 to 100 cm. The models can be used throughout coastal British Columbia.

Coastal Sitka Spruce

Source:

Nigh, G.D. 1999. Revised growth intercept models for coastal western hemlock, Sitka spruce, and interior spruce. B.C. Min. For., Res. Br., Victoria, B.C. Exten. Note 37.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 4.37\ GI_1^{0.503}$	26	$SI = 1.3 + 0.974\ GI_{26}^{0.819}$
2	$SI = 1.3 + 3.16\ GI_2^{0.573}$	27	$SI = 1.3 + 0.948\ GI_{27}^{0.825}$
3	$SI = 1.3 + 3.01\ GI_3^{0.583}$	28	$SI = 1.3 + 0.923\ GI_{28}^{0.832}$
4	$SI = 1.3 + 2.90\ GI_4^{0.590}$	29	$SI = 1.3 + 0.891\ GI_{29}^{0.840}$
5	$SI = 1.3 + 2.81\ GI_5^{0.598}$	30	$SI = 1.3 + 0.878\ GI_{30}^{0.844}$
6	$SI = 1.3 + 2.77\ GI_6^{0.601}$	31	$SI = 1.3 + 0.857\ GI_{31}^{0.849}$
7	$SI = 1.3 + 2.89\ GI_7^{0.589}$	32	$SI = 1.3 + 0.820\ GI_{32}^{0.860}$
8	$SI = 1.3 + 3.04\ GI_8^{0.574}$	33	$SI = 1.3 + 0.799\ GI_{33}^{0.867}$
9	$SI = 1.3 + 3.10\ GI_9^{0.567}$	34	$SI = 1.3 + 0.780\ GI_{34}^{0.873}$
10	$SI = 1.3 + 3.05\ GI_{10}^{0.567}$	35	$SI = 1.3 + 0.764\ GI_{35}^{0.879}$
11	$SI = 1.3 + 2.93\ GI_{11}^{0.575}$	36	$SI = 1.3 + 0.749\ GI_{36}^{0.884}$
12	$SI = 1.3 + 2.78\ GI_{12}^{0.585}$	37	$SI = 1.3 + 0.735\ GI_{37}^{0.889}$
13	$SI = 1.3 + 2.56\ GI_{13}^{0.603}$	38	$SI = 1.3 + 0.723\ GI_{38}^{0.894}$
14	$SI = 1.3 + 2.31\ GI_{14}^{0.625}$	39	$SI = 1.3 + 0.711\ GI_{39}^{0.899}$
15	$SI = 1.3 + 2.10\ GI_{15}^{0.646}$	40	$SI = 1.3 + 0.697\ GI_{40}^{0.905}$
16	$SI = 1.3 + 1.90\ GI_{16}^{0.669}$	41	$SI = 1.3 + 0.677\ GI_{41}^{0.913}$
17	$SI = 1.3 + 1.73\ GI_{17}^{0.690}$	42	$SI = 1.3 + 0.655\ GI_{42}^{0.922}$
18	$SI = 1.3 + 1.60\ GI_{18}^{0.707}$	43	$SI = 1.3 + 0.635\ GI_{43}^{0.931}$
19	$SI = 1.3 + 1.50\ GI_{19}^{0.722}$	44	$SI = 1.3 + 0.615\ GI_{44}^{0.940}$
20	$SI = 1.3 + 1.40\ GI_{20}^{0.737}$	45	$SI = 1.3 + 0.592\ GI_{45}^{0.950}$
21	$SI = 1.3 + 1.30\ GI_{21}^{0.753}$	46	$SI = 1.3 + 0.570\ GI_{46}^{0.961}$
22	$SI = 1.3 + 1.21\ GI_{22}^{0.771}$	47	$SI = 1.3 + 0.549\ GI_{47}^{0.971}$
23	$SI = 1.3 + 1.12\ GI_{23}^{0.788}$	48	$SI = 1.3 + 0.530\ GI_{48}^{0.981}$
24	$SI = 1.3 + 1.05\ GI_{24}^{0.802}$	49	$SI = 1.3 + 0.514\ GI_{49}^{0.990}$
25	$SI = 1.3 + 1.00\ GI_{25}^{0.812}$	50	$SI = 1.3 + 0.499\ GI_{50}^{0.999}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Coastal Sitka Spruce

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	30	49	–	–	–	–	–	–	–	–	–	–	–	–
4	18	30	39	47	–	–	–	–	–	–	–	–	–	–
6	14	23	30	36	41	46	–	–	–	–	–	–	–	–
8	12	20	25	30	34	38	41	45	48	–	–	–	–	–
10	11	17	22	26	29	32	35	38	41	43	46	48	50	–
12	–	15	19	22	26	29	31	34	36	39	41	43	45	47
14	–	13	16	20	23	25	28	30	33	35	37	39	41	43
16	–	11	14	17	20	22	25	27	29	31	34	36	37	39
18	–	–	12	15	18	20	22	25	27	29	31	33	34	36
20	–	–	11	14	16	18	20	22	24	26	28	30	32	33
22	–	–	10	12	14	16	18	20	22	24	26	28	29	31
24	–	–	–	11	13	15	17	19	20	22	24	25	27	29
26	–	–	–	10	12	14	15	17	19	20	22	24	25	27
28	–	–	–	–	11	13	14	16	18	19	21	22	24	25
30	–	–	–	–	10	12	14	15	17	18	19	21	22	24
32	–	–	–	–	10	11	13	14	16	17	18	20	21	22
34	–	–	–	–	–	11	12	13	15	16	17	19	20	21
36	–	–	–	–	–	10	11	13	14	15	17	18	19	20
38	–	–	–	–	–	10	11	12	13	15	16	17	18	19
40	–	–	–	–	–	–	10	12	13	14	15	16	17	19
42	–	–	–	–	–	–	10	11	12	13	14	16	17	18
44	–	–	–	–	–	–	–	10	12	13	14	15	16	17
46	–	–	–	–	–	–	–	10	11	12	13	14	15	16
48	–	–	–	–	–	–	–	–	10	12	13	14	15	16
50	–	–	–	–	–	–	–	–	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
49	–	–	–	–	–	–	–	–	–	–	–	–	–	12
45	46	48	50	–	–	–	–	–	–	–	–	–	–	14
41	43	45	46	48	50	–	–	–	–	–	–	–	–	16
38	40	41	43	45	46	48	50	–	–	–	–	–	–	18
35	37	38	40	42	43	45	46	48	49	–	–	–	–	20
33	34	36	37	39	40	42	44	45	46	48	49	–	–	22
30	32	33	35	36	38	39	41	42	44	45	47	48	49	24
28	30	31	33	34	36	37	38	40	41	43	44	45	47	26
27	28	29	31	32	34	35	36	38	39	40	41	43	44	28
25	26	28	29	30	32	33	34	36	37	38	39	41	42	30
24	25	26	28	29	30	31	33	34	35	36	37	39	40	32
22	24	25	26	27	29	30	31	32	33	35	36	37	38	34
21	23	24	25	26	27	29	30	31	32	33	34	35	37	36
20	22	23	24	25	26	27	28	30	31	32	33	34	35	38
20	21	22	23	24	25	26	27	28	30	31	32	33	34	40
19	20	21	22	23	24	25	26	27	29	30	31	32	33	42
18	19	20	21	22	23	24	26	27	28	29	30	31	32	44
17	18	19	20	22	23	24	25	26	27	28	29	30	31	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the annual whorls. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

These models were updated to incorporate the latest growth intercept modelling techniques.

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row corresponding to the ring count and the column most closely corresponding to the tree height. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 38 stem analysis plots located in the Coastal Western Hemlock biogeoclimatic zone. Plots ranged in site index from about 16 to 40 m, and the growth intercepts ranged from about 20 to 90 cm. The models can be used throughout coastal British Columbia.

Coastal Douglas-fir

Source:

Nigh, G.D. 1997. A growth intercept model for coastal Douglas-fir. B.C. Min. For., Res. Br., Victoria, B.C. Res. Rep. 10.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 3.89\ GI_1^{0.538}$	26	$SI = 1.3 + 0.658\ GI_{26}^{0.906}$
2	$SI = 1.3 + 2.55\ GI_2^{0.633}$	27	$SI = 1.3 + 0.659\ GI_{27}^{0.906}$
3	$SI = 1.3 + 2.45\ GI_3^{0.633}$	28	$SI = 1.3 + 0.641\ GI_{28}^{0.913}$
4	$SI = 1.3 + 2.35\ GI_4^{0.636}$	29	$SI = 1.3 + 0.624\ GI_{29}^{0.920}$
5	$SI = 1.3 + 2.19\ GI_5^{0.647}$	30	$SI = 1.3 + 0.618\ GI_{30}^{0.924}$
6	$SI = 1.3 + 2.03\ GI_6^{0.659}$	31	$SI = 1.3 + 0.616\ GI_{31}^{0.925}$
7	$SI = 1.3 + 1.77\ GI_7^{0.688}$	32	$SI = 1.3 + 0.603\ GI_{32}^{0.931}$
8	$SI = 1.3 + 1.60\ GI_8^{0.708}$	33	$SI = 1.3 + 0.591\ GI_{33}^{0.937}$
9	$SI = 1.3 + 1.44\ GI_9^{0.730}$	34	$SI = 1.3 + 0.580\ GI_{34}^{0.943}$
10	$SI = 1.3 + 1.27\ GI_{10}^{0.757}$	35	$SI = 1.3 + 0.564\ GI_{35}^{0.951}$
11	$SI = 1.3 + 1.16\ GI_{11}^{0.776}$	36	$SI = 1.3 + 0.564\ GI_{36}^{0.952}$
12	$SI = 1.3 + 1.04\ GI_{12}^{0.798}$	37	$SI = 1.3 + 0.550\ GI_{37}^{0.958}$
13	$SI = 1.3 + 0.972\ GI_{13}^{0.814}$	38	$SI = 1.3 + 0.546\ GI_{38}^{0.962}$
14	$SI = 1.3 + 0.897\ GI_{14}^{0.831}$	39	$SI = 1.3 + 0.536\ GI_{39}^{0.967}$
15	$SI = 1.3 + 0.881\ GI_{15}^{0.834}$	40	$SI = 1.3 + 0.529\ GI_{40}^{0.971}$
16	$SI = 1.3 + 0.837\ GI_{16}^{0.846}$	41	$SI = 1.3 + 0.518\ GI_{41}^{0.977}$
17	$SI = 1.3 + 0.787\ GI_{17}^{0.860}$	42	$SI = 1.3 + 0.514\ GI_{42}^{0.980}$
18	$SI = 1.3 + 0.755\ GI_{18}^{0.869}$	43	$SI = 1.3 + 0.511\ GI_{43}^{0.983}$
19	$SI = 1.3 + 0.737\ GI_{19}^{0.875}$	44	$SI = 1.3 + 0.504\ GI_{44}^{0.988}$
20	$SI = 1.3 + 0.717\ GI_{20}^{0.882}$	45	$SI = 1.3 + 0.499\ GI_{45}^{0.991}$
21	$SI = 1.3 + 0.701\ GI_{21}^{0.887}$	46	$SI = 1.3 + 0.490\ GI_{46}^{0.997}$
22	$SI = 1.3 + 0.681\ GI_{22}^{0.894}$	47	$SI = 1.3 + 0.484\ GI_{47}^{1.00}$
23	$SI = 1.3 + 0.681\ GI_{23}^{0.895}$	48	$SI = 1.3 + 0.486\ GI_{48}^{1.00}$
24	$SI = 1.3 + 0.674\ GI_{24}^{0.898}$	49	$SI = 1.3 + 0.484\ GI_{49}^{1.00}$
25	$SI = 1.3 + 0.670\ GI_{25}^{0.900}$	50	$SI = 1.3 + 0.489\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Coastal Douglas-fir

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	30	–	–	–	–	–	–	–	–	–	–	–	–	–
4	17	29	38	47	–	–	–	–	–	–	–	–	–	–
6	12	21	28	34	39	45	50	–	–	–	–	–	–	–
8	–	16	21	27	31	36	40	44	48	–	–	–	–	–
10	–	13	17	22	26	29	33	37	40	43	47	50	–	–
12	–	10	14	18	21	25	28	31	34	37	40	43	46	49
14	–	–	12	15	18	21	24	27	30	33	35	38	40	43
16	–	–	11	14	16	19	22	24	27	29	31	34	36	38
18	–	–	–	12	14	17	19	22	24	26	28	30	33	35
20	–	–	–	11	13	15	18	20	22	24	26	28	30	32
22	–	–	–	10	12	14	16	18	20	22	24	26	27	29
24	–	–	–	–	11	13	15	17	19	20	22	24	26	27
26	–	–	–	–	11	12	14	16	17	19	21	22	24	26
28	–	–	–	–	10	12	13	15	16	18	19	21	23	24
30	–	–	–	–	–	11	12	14	15	17	18	20	21	23
32	–	–	–	–	–	10	12	13	15	16	17	19	20	22
34	–	–	–	–	–	10	11	12	14	15	16	18	19	20
36	–	–	–	–	–	–	11	12	13	14	16	17	18	20
38	–	–	–	–	–	–	10	11	13	14	15	16	17	19
40	–	–	–	–	–	–	10	11	12	13	14	16	17	18
42	–	–	–	–	–	–	–	10	11	13	14	15	16	17
44	–	–	–	–	–	–	–	10	11	12	13	14	15	16
46	–	–	–	–	–	–	–	10	11	12	13	14	15	16
48	–	–	–	–	–	–	–	–	10	11	12	13	14	15
50	–	–	–	–	–	–	–	–	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
–	–	–	–	–	–	–	–	–	–	–	–	–	–	12
46	48	50	–	–	–	–	–	–	–	–	–	–	–	14
41	43	45	47	49	–	–	–	–	–	–	–	–	–	16
37	39	41	43	45	47	49	–	–	–	–	–	–	–	18
34	36	38	39	41	43	45	47	49	–	–	–	–	–	20
31	33	35	37	38	40	42	44	45	47	49	50	–	–	22
29	31	32	34	36	37	39	41	42	44	45	47	49	50	24
27	29	30	32	33	35	37	38	40	41	43	44	46	47	26
26	27	29	30	32	33	34	36	37	39	40	42	43	45	28
24	26	27	28	30	31	33	34	35	37	38	40	41	42	30
23	24	26	27	28	30	31	32	34	35	36	38	39	40	32
22	23	24	26	27	28	30	31	32	33	35	36	37	39	34
21	22	23	25	26	27	28	30	31	32	33	34	36	37	36
20	21	22	23	25	26	27	28	29	31	32	33	34	35	38
19	20	21	23	24	25	26	27	28	29	31	32	33	34	40
18	19	21	22	23	24	25	26	27	28	30	31	32	33	42
18	19	20	21	22	23	24	25	26	27	29	30	31	32	44
17	18	19	20	21	22	23	24	25	27	28	29	30	31	46
16	17	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the annual whorls. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

This is the first species to have growth intercept models up to breast height age 50.

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row corresponding to the ring count and the column most closely corresponding to the tree height. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 47 stem analysis plots located in the Coastal Western Hemlock and Coastal Douglas-fir biogeoclimatic zones. Plots ranged in site index from about 15 to 46 m, and the growth intercepts ranged from about 22 to 108 cm. The models can be used throughout coastal British Columbia.